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(12) United States Patent

Tsukuda et al.

US 6,274,220 B1 (10) Patent No.:

(45) Date of Patent:

*Aug. 14, 2001

(54) AROMATIC POLYAMIDE RESIN MOLDINGS, PRODUCTION METHODS THEREOF, AND MAGNETIC RECORDING MEDIUM PRODUCED THEREFROM

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This patent issued on a continued pros-(*) Notice: ecution application filed under 37 CFR

1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.:

09/066,312

(22) PCT Filed:

Aug. 29, 1997

(86) PCT No.:

PCT/JP97/03036

§ 371 Date:

Apr. 28, 1998

§ 102(e) Date: Apr. 28, 1998

(87) PCT Pub. No.: WO98/08892

PCT Pub. Date: Mar. 5, 1998

(30)Foreign Application Priority Data

| Aug. Aug. | 29, 1996 29, 1996 | (JP) (JP) | 8-229019 8-229020 |
|--------------|-----------------------|--------------|----------------------------------|
| (51) | Int. Cl. ⁷ | | G11B 8/73 ; G11B 5/78 |
| (52) | U.S. Cl. | | 428/141; 428/323; 428/458 |
| | 428/4 | 74.4; 42 | 28/477.7; 428/694 SL; 428/694 SG |

428/900; 156/242; 156/244.24 (58) Field of Search 428/323, 325. 428/328, 329, 330, 331, 688, 694 T, 394 TS, 694 TB, 694 TR, 458, 474.4, 477.7, 539.5, 900, 928, 545, 611, 612, 694 BR, 694 BA, 394 SG, 141, 694 SL; 156/242, 244.24

(56)References Cited

U.S. PATENT DOCUMENTS

| 4,645,702 | * | 2/1987 | Asakura et al | 428/141 |
|-----------|---|---------|---------------|---------|
| 5,686,166 | • | 11/1997 | Tsukuda et al | 428/141 |
| 5,780,387 | * | 7/1998 | Harada | 503/226 |
| 5,886,819 | * | 3/1999 | Murata et al | 359/483 |

FOREIGN PATENT DOCUMENTS

| 0 702 359 | | 3/1996 | (EP) . |
|------------|---|---------|--------|
| 0 702 361 | | 3/1996 | (EP) . |
| 0 842 754 | | 5/1998 | (EP) . |
| 882759A1 | * | 12/1998 | (EP) . |
| 60-127523A | + | 7/1985 | (JP). |
| 01247162A | * | 10/1989 | (JP) . |
| 10265589A | * | 10/1998 | (JP) . |
| 11003513A | • | 1/1999 | (JP) . |
| 11106529A | ٠ | 4/1999 | (JP). |

^{*} cited by examiner

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(57)**ABSTRACT**

The present invention provides aromatic polyamide resin moldings comprising at least one surface that is 1.0 nm or more in root-mean-square roughness and is 80 nm or less in 10-point average roughness, both of the roughness being as determined by atomic force microscopy, and that is 9.8 GPa or more in tensile Young's modulus at least in one direction. Such aromatic polyamide resin moldings serve effectively as material for film, film for magnetic recording medium in particular, that is highly resistant to scraping and has highly uniform surface protrusions.

20 Claims, No Drawings